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and paleontology. The volume is abundantly illustrated and both the formations and the fossils afford excellent material for this purpose. A full bibliography enhances the value of the volume.

R. D. S.

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*Mineral Resources of Michigan for 1914 and Prior Years.* Prepared under the direction of R. C. ALLEN. With a treatise on Michigan copper deposits by R. E. HORE. Michigan Geological and Biological Survey, Publication No. 19, 1915.

*Mineral Resources of Michigan for 1917 and Prior Years.* Prepared under the direction of R. C. ALLEN. Michigan Geological and Biological Survey, Publication No. 27, 1918.

These volumes were not received until late in 1920. The noteworthy feature (besides the statistics on the copper and iron industries, as well as on the non-metallic minerals) is the presence in the 1914 number of a 150-page treatise on the Michigan copper deposits, by R. E. Hore. This article serves as an excellent summary of existing knowledge on these deposits, as well as giving the author's ideas on the subject. Hore believes the native copper is essentially a primary replacement deposit from solutions (probably carrying the copper as the chloride) which accompanied and followed the extrusion of the lavas. A feature of the work is the presence of some thirty photomicrographs of polished sections.

D J. F.

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*Field Methods in Petroleum Geology.* By G. H. COX, C. L. DAKE, and G. A. MUILENBURG. First edition, pp. xiv+305. McGraw-Hill Book Company, Inc., 1921. \$4.00.

Petroleum geologists, particularly those who are lacking in field experience, will welcome this book. It treats chiefly of the recognition of structural features favorable for the accumulation of petroleum, and of map-making and the instruments used in making maps. It includes the solution of geologic problems and the making of a geologic report. Problems of a "resident geologist" are not included. Graphic solutions of geologic problems are also omitted. It is assumed that the reader has a knowledge of the fundamental principles of geology and mathematics, including trigonometry.

Chapter I contains a description of the large variety of instruments used by geologists, and Chapter II outlines instrumental methods in

general use. Chapters III and IV include a discussion of the surface features which lead to the identification of strata and structural conditions; the methods of obtaining and recording geologic data; also the actual field procedure from the selection of the field party to the preparation of the final reconnaissance or detailed report.

The statement is made (p. 129) that "the field work of a petroleum geologist is . . . made up largely of a search for anticlines and terraces, and of mapping such areas." This statement would have been more nearly correct a few years ago.

The book contains a glossary of about four hundred words, such as: Algonkian, Carboniferous, Cenozoic, Contours, Dip Slope, Orientation Rod, Stadia, Sedimentation, Volcanic Ash. There is also an appendix containing tables of natural functions, reductions of stadia observations for rod readings of 100, stadia tables for obtaining differences of elevations, gradienter table (Stebbing's drum) for determining distances, and a number of other tables, including barometric corrections.

A limp leather binding and pocket size make the book convenient for field use.

W. O. G.

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*Lithologic Subsurface Correlation in the "Bend Series" of North Central Texas.* By MARCUS I. GOLDMAN. U.S. Geological Survey, Professional Paper 129 A, 1921, Govt. Printing Office, Washington. Pp. 22, pl. 1, fig. 1.

Since the early work of Hatch, the micro-petrology of sediments remained a rather neglected field to which the physiographer has only turned now and then in the exceptional instances when there was a question whether a certain sand was wind- or water-laid, a field almost wholly ignored by the stratigrapher. Now the subsurface lithologic correlations in oil fields have assumed economic importance, however, interest in the long-neglected subject is revived, and geologists are glad to learn of the establishment by the U.S. Geological Survey of a laboratory devoted to the study of sediments. The paper here reviewed represents an invaluable addition to the technology of petrographic correlation from well logs and well samples.

The problem presented was the correlation of sediments thought to be the equivalents of the Smithwick and Marble Falls beds and of a part of the Strawn formation of Pennsylvanian age, as well as of the Lower Bend Series (Mississippian) in north central Texas. The method employed was much like that outlined by Trager (*Econ. Geol.*, XV, 1920);